⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭61－248375

⑤1Int.Cl.⁴	識別記号	庁内整理番号	㊸公開　昭和61年(1986)11月5日
H 01 R 23/02		6574－5E	

審査請求　未請求　発明の数 1　（全8頁）

㊹発明の名称　電気コネクタ

㉑特　願　昭60－89878
㉒出　願　昭60(1985)4月25日

㉒発明者　長谷川　厳水　横浜市保土ケ谷区川島町683番地
㉒発明者　加茂野　高　横浜市戸塚区長尾台町58－3
㉑出願人　アンプ　インコーポレーテッド　アメリカ合衆国　ペンシルバニア州　ハリスバーグ　アイゼンハワー　ブルーバード（番地なし）
㉔代理人　弁理士　柳田　征史　外1名

明　細　書

1．発明の名称

電気コネクタ

2．特許請求の範囲

絶縁材料被覆内に複数の信号線とこの信号線の間に配された複数の接地線とを有する電気ケーブルの終端形成用の電気コネクタであって、

絶縁材料製のハウジングと、

一端が前記複数の信号線とそれぞれ接続し、他端に前記電気コネクタが接続される相手部材の信号端子と接触する信号接触部を有し、前記ハウジング内に2列に並んで配された複数の信号用接触子と、

一端が前記複数の接地線と接続し、他端に前記相手部材の接地端子と接触する接地接触部を有し、前記信号用接触子の前記2列の間に1列に並んで配された複数の接地用接触子とからなることを特徴とする電気コネクタ。

3．発明の詳細な説明

（産業上の利用分野）

本発明は、コンピュータ等の内部信号配線用等として用いられる電気ケーブル（トランスミッションケーブル）の終端に取り付けられる電気コネクタに関し、主として該電気コネクタをプリント基板に固定されたポストヘッダーに接続するため等に用いられる電気コネクタに関するものである。

（従来技術）

コンピュータ等の内部信号配線用トランスミッションケーブルは、複数の信号線を有してなるが、絶縁被覆内に複数の信号線を近接して配しただけでは、隣接する信号線間で信号が交りいれするクロストークが生じるという問題がある。このため、この種の電気ケーブルとしては、絶縁被覆内において複数の信号線を互いに平行に平面上に配し、且つ各信号線間にそれぞれ接地線を配し、この接地線により隣接する信号線間の遮へいを行ないクロストークを防止するようにしたものが用いられる。

この種の電気ケーブルを用いれば、ケーブル内におけるクロストークは防止できるのであるが、このケーブルの終端に取り付けられケーブルとプリント基板等との電気接続用コネクタにおいて、上記接地線とプリント基板等の接地部との接続が問題となり易い。電気ケーブルの接地線をプリント基板の接地部と接続させる電気コネクタ例として、本出願人は特開昭55-144666号公報に開示されているように、各信号線と接続するレセプタクル接触子の一部を接地線とも接続させこれを接地部との接続用として用いるものを提案している。この提案のようにすれば、接地用として用いられるレセプタクル接触子によってこのレセプタクル接触子に隣接する信号用レセプタクル接触子間のクロストークを防止できるが、接地用として用いられるレセプタクル接触子によっては信号を送ることができないため実装密度が低下するという問題がある。特に、レセプタクル接触子間のクロストークの防止を図るには、接地用レセプタクル接触子の数を増す必要があり、これにより実装密度はさらに低下するという問題がある。

（発明の目的）

本発明は上記のような問題に鑑みたもので、実装密度を低下させることなく、且つ各信号用接触子間のクロストークの防止も十分に行なうことのできる電気コネクタを提供することを目的とするものである。

（発明の構成）

本発明の電気コネクタは、一端が電気ケーブルの複数の信号線とそれぞれ接続した複数の信号用接触子の他端に、この電気コネクタが接続される相手部材（例えば、プリント基板）の信号端子と接触する信号接触部を形成し、且つこの複数の信号用接触子を絶縁ハウジング内に2列に並んで配し、一端が電気ケーブルの接地線と接続した複数の接地用接触子の他端に、上記相手部材の接地端子と接触する接地接触部を形成し、この複数の接地用接触子を上記2列に並んだ信号用接触子の列と列との間に1列に並んで配したことを特徴とするものである。

（実　施　例）

以下、図面により本発明の実施例について説明する。

第1図はコンピュータ等の内部配線等に用いられるトランスミッションケーブル1の終端に本発明に係る電気コネクタ2を取り付けた状態を示す斜視図である。このトランスミッションケーブル1は矢印A－Aの断面図である第2A図に示すように絶縁被覆1a内に信号線Sと接地線Gとを互いに平行に交互に配してなる。なお、このケーブル1としては第2B図に示すように信号線Sの間に各2本の接地線Gを配してもよい。いずれも、接地線Gにより各信号線S同士を遮へいしてクロストークを防止するものである。

電気コネクタ2は、絶縁材料製ハウジング10内に複数の信号用接触子および複数の接地用接触子を配し、この信号用接触子を上記ケーブルの信号線と接続させ、接地用接触子を接地線と接続させ、これら接続部を上下カバー3a、3bを覆ってなる。ハウジング10の前面10aには、上記信号用および接地用接触子と接触して電気接続を行なわせる雄端子挿入用の孔が幅方向に並んで形成される。この挿入孔は上下に3列になって幅方向に延びて形成され、上列挿入孔11、11、……、11および下列挿入孔12、12、……、12は信号用雄端子挿入孔であり、中間列挿入孔13、13、……、13は接地用雄端子挿入孔である。本例では、上下列挿入孔11、12に対し中間列挿入孔13が千鳥状に配列されているが、これにより各雄端子間の間隔をできる限り大きくして、雄端子が取り付けられるプリント基板上の配線を行ない易くしようとするものである。このため、各雄端子間の間隔が大きい時は、本例のように千鳥状の配列でなくてもよく、格子状に配列してもよい。

また、このように千鳥状に配列すると、各信号用雄端子の配列は従来の配列と同じで、これに接地用雄端子を加えることができるので、従来のように信号用雄端子の一部を接地用端子として用いる必要もなく、実装密度が高くなる。

次に、矢印Ｂ－Ｂおよび矢印Ｃ－Ｃに沿って本電気コネクタ２を断面した図を第３図および第４図に示し、これにより内部構造を説明する。

第３図は矢印Ｂ－Ｂに沿った断面図で、信号用雄端子挿入孔１１、１２を通る断面を示す。ハウジング１０の内部には、上列および下列の各信号用端子挿入孔１１、１２に対向した信号接触部２２、３２を先端に有する上および下信号用接触子２０、３０が配され、これら信号用接触子２０、３０の基部２１、３１は絶縁材料製樹脂がインサートモールドされた保持部４０により固定保持されている。保持部４０の上下端の突起４１、４１はハウジング１０の係合孔１５、１５に挿入されて嵌合し、保持部４０はハウジング１０に保持されている。信号用接触子２０、３０の後端２３、３３（３３は図示せず）は、保持部４０から後方に突出し、この後端２３、３３にトランスミッションケーブル１の信号線Ｓが接続され、この接続部が上下カバー３ａ、３ｂにより覆われている。なお、本図では上列および下列の信号用接触子20、３０の後　２３、３３は重なっているが、後端２３、３３は紙面に直角な方向において所定の間隔を置いて配されており、各信号用接触子２０、３０はそれぞれ異なる信号線Ｓと接続されている。さらに、上列および下列の信号用接触子２０、３０の間には、第４図に示す接地用接触子６２と一体になって接地用接触子の配列方向に延びる遮へい板６１が配され、この遮へい板６１は接地されるのでこれにより両信号用接触子２０、３０間でのクロストークを防止するようになっている。なお、両信号用接触子２０、３０の信号接触部２２、３２は、ハウジング１０の前面１０ａの信号用端子挿入孔１１、１２から信号用雄端子５、６が挿入されてきた時に、接触子２０、３０自体の弾性力でこの雄端子５、６を挟持して雄端子５、６と電気的接続を行なうものである。この時、雄端子５、６により接触部２２、３２が押し拡げられて遮へい板６１と接触するおそれがあるため、遮へい板６１の接触部２２、３２と対向する面には絶縁性ラミネートフィルムをコーティングしており、このラミネートフィルムにより接触部２２、３２が遮へい板に接触しても信号用接触子２０、３０を流れる信号がアースされないようにしている。

第４図は第１図の矢印Ｃ－Ｃに沿った断面図で、接地用雄端子挿入孔１３を通る断面を示す。ハウジング１０に保持された保持部４０には、接地用基板５０が固定保持され、この接地用基板５０は後端５２がトランスミッションケーブル１の接地線Ｇと接続し、前端５１、５１は二股に分かれて、接地用接触子６２の基部係合部６３と係合する。この係合は、基部係合部６３を二股状の前端５１、５１の間に圧入して、基部係合部６３の弾性力により両者を係合保持させるものである。接地用接触子６２は先端に接地接触部６４を有し、接地用雄端子挿入孔１３を介して挿入される接地用雄端子７を弾性的に挟持し、該雄端子７と電気的に接続し、トランスミッションケーブル１の接地線Ｇをアースさせる。なお、接地用接触子６２は遮へい板６１と一体に形成されるため、両者は共に接地用雄端子７を介してアースされ、これらによる信号用接触子２０、３０間でのクロストークが効果的に防止される。

以上に説明した、上および下信号用接触子２０、３０、接地用接触子６２および遮へい板６１をハウジング１０内に取り付けた状態で透視して示すのが第５図である。上および下信号用接触子２０、３０はそれぞれ上列および下列の信号用端子挿入孔１１、１２に対向して一列に並んで配され、この一列に並んだ上および下信号用接触子２０、３０の間に接地用接触子６２および遮へい板６１を交互に一列に配してなる接地板６０が配される。接地板６０は、これを適宜切断、成形して図示の如く接地用接触子６２および遮へい板６１を一体に有する金属板で、基部には、接地用基板５１の一対の前端５１、５１内に圧入される基部係合部６３も一体に有する。

次に、上記信号用接触子２０、３０接地用接触子６０等の製造工程を示し、その構造を説明する。

まず、第６Ａ図および第６Ｂ図に示すように、導電性金属板１００を図示の形状にカットする。

このカット後の形状において、連結部１０１ｃを介して繋がる２板の板１０１ａ、１０１ｂが接地用接触子２０、３０の接触部２２、３２を形成する部分である。さらに、１０４、１０５は製造工程中に各接触子を一体に連結保持するためのキャリアで、下部キャリア１０５に繋がる幅広のプレート部１０２がケーブル１の信号線Ｓと接続する信号用接触子の後端２２（３２）となる部分で、幅狭のプレート部１０３が接地用基板５０となる部分である。

次いで、第７Ａ図および第７ｂ図に示すように、板１０１ｂに対して連結部１０１ｃを９０°折り曲げ、さらに連結部１０１ｃに対して板１０１ａを９０°折り曲げて、“コ”の字状に形成し、さらに両板１０１ａ、１０１ｂの上部を第７ｂ図の如く変形させ接触部２２（又は３２）の形状を作り出す。

次いで、第８Ａ図から第８Ｃ図に示すように、プレート部１０２、１０３の上部を幅方向に絶縁性樹脂をインサートモールドして、第１保持部42を形成する。この第１保持部４２の下面４２ａは鋸歯状であるが、これは後述するように、第２保持部４３との位置合わせのためのものである。

次いで、第９Ａ図から第９Ｃ図に示すように、上部キャリア１０４をカットし、信号用接触子２０、２２のみを残す。さらに、下部キャリア１０５とともに、プレート部１０２、１０３の上部を第９Ｂ図のように片側へ折り曲げる。

このようにして、一列に並んだ信号用接触子アセンブリ１１０が形成されるが、本発明では信号用接触子アセンブリを二列に配しているため、上記と同様の工程を経て、第１０Ａ図から第１０Ｃ図に示すような上記アセンブリ１１０とほぼ対称形のアセンブリ１２０を作る。但し、このアセンブリ１２０は下部キャリア１０５もカットしており、プレート部１０２´、１０３´のみが第１保持部４２´から下方へ突出した状態になっている。

次いで、第１１Ａ図および第１１Ｂ図に示すように両アセンブリ１１０、１２０を各第１接触子４２、４２´の鋸歯状の面同士を合わせて一体にする。この時、接地用基板５０の後端５２となるプレート部１０３と１０３´とは互いに対向して重なるが、信号用接触子２０、３０の後端２３、３３となるプレート部１０２、１０２´はプレート部１０３の間において幅方向にずれて位置し重ならないようになっている。

このようにして重ね合せた両アセンブリ１１０、１２０の第１保持部４２、４２´の下部に、第１２Ａ図および第１２Ｂ図に示すように樹脂をインサートモールドして第２保持部４３を形成し、両アセンブリ１１０、１２０を一体に結合させる。なお、第１保持部４２、４２´および第２保持部４３が一体となって第３図および第４図に示した保持部４０を形成することになる。この後、下部キャリアを第１２Ａ図の如くカットして、接地用基板５０の後端５２は連結板５３により繋がった状態で残し、各信号用接触子２０、３０の後端２３、３３は接地用基板５０の各後端５２の間に所定間隔を置いて位置するようにされる。さらに、接地用基板５０の先端５１は各々が所定間隔を置いて対向する一対のプレートとして保持部４０から上方に突出する。

第１３Ａ図および第１３Ｂ図は、接地用接触子６２および遮へい板６１を一体に有する接地板６０を示す正面図および下面図であり、矢印Ｄ－Ｄおよび矢印Ｅ－Ｅに沿った断面を示す第１４図および第１５図に示すように、接地板６０は１板の金属板をＵ字状に折り曲げてなり、接地用接触子６２および遮へい板６１が交互に複数個並んで形成される。第１４図に示すように、接地用接触子６２の上部は図示の如く成形されて接地用雄端子７を受け入れる接触部６４が形成されており、この接地用接触子６２の基部は一部カットされて外方へ拡がって基部係合部６３が形成されている。また、第１５図に示すように、遮へい板６１は、ほぼ平行な２板の板が対向するように形成されている。なお、本例では、接地板６０を１枚の金属板をＵ字状に折り曲げて形成する例を示したが、２枚の板を接合して作っても良い。

このように形成した接地板６０を、第１２Ａ図

および第１２Ｂ図に示した接触子アセンブリの、２列に並んだ信号用接触子２０、３０の列と列との間に取り付ける。このようにして、接地板６０を取り付けた全体アセンブリを示すのが第１６Ａ図および第１６Ｂ図である。接地板６０の取り付けは、矢印Ｆ－Ｆに沿った断面を示す第１７図に示すように、保持部４０に固定保持されて上方に突出する一対の接地用基板５０の前端５１、５１の間に基部係合部６３を圧入して係合させて行なう。このように圧入して接地板６０を取り付けると、第１６Ａ図の矢印Ｇ－Ｇに沿った断面を示す第１８図に示すように、遮へい板６２は両信号用接触子２０、３０の間に位置する。

なお、以上においてはコンピュータ用トランスミッションケーブル用の電気コネクタの例を示したが、本電気コネクタはこれに限らず、一般同軸ケーブル等、シールドを必要とするケーブルの接続用として用いることができる。

（発明の効果）

以上説明したように、本発明によれば信号接触子を２列に並べて配し、この２列の間に接地用接触子を一列に並べて配するように構成しているので、この接地用接触子により各信号用接触子間の遮へいをなすことができ信号用接触子間のクロストークを防止することができる。また、接地用接触子は専用の接地用端子と接続させるようにしているので、従来のように信号用接触子の一部を接地用として用いる必要がなく実装密度を高めることができる。

4．図面の簡単な説明

第１図は本発明に係る電気コネクタの１例を示す斜視図、

第２Ａ図および第２Ｂ図は第１図に示すケーブルを矢印Ａ－Ａに沿って切断して示す断面図、

第３図および第４図は、第１図の電気コネクタを矢印Ｂ－ＢおよびＣ－Ｃに沿って切断して示す断面図、

第５図は第１図の電気コネクタの接触子のみを透視して示す斜視図、

第６図から第１２図は本発明の電気コネクタ用接触子アセンブリの製造工程を順に示す図で、第６Ａ図、第７Ａ図、第８Ａ図、第９Ａ図、第１０Ａ図、第１１Ａ図および第１２Ａ図は該アセンブリの正面図、第６Ｂ図、第７Ｂ図、第８Ｂ図、第９Ｂ図、第１０Ｂ図、第１１Ｂ図および第１２Ｂ図は該アセンブリの側面図、第８Ｃ図、第９Ｃ図、第１０Ｃ図は該アセンブリの底面図、

第１３Ａ図および第１３Ｂ図は本発明の電気コネクタ用接地板を示す正面図および底面図、

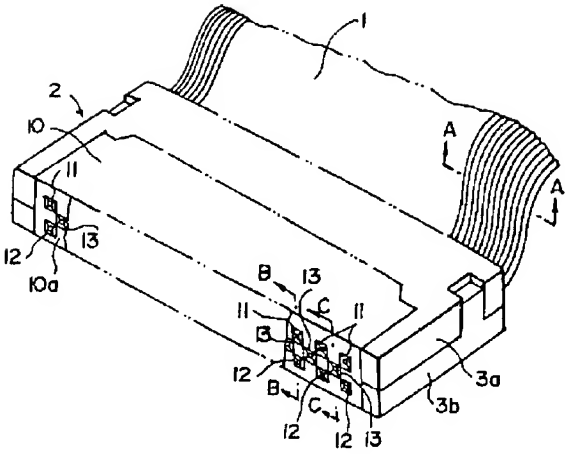
第１４図および第１５図は該接地板を矢印Ｄ－ＤおよびＥ－Ｅに沿って切断して示す断面図、

第１６Ａ図および第１６Ｂ図は、第１２図のアセンブリに第１３図の接地板を取り付けた状態を示す正面図および側面図、

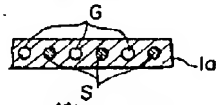
第１７図および第１８図は第１６Ａ図の矢印Ｆ－ＦおよびＧ－Ｇに沿った断面図である。

１…トランスミッションケーブル
２…電気コネクタ
１０…ハウジング　　１１…上列挿入孔
１２…下列挿入孔　　１３…中間列挿入孔
２０、３０…信号用接触子
２２、３２…信号接触部
４０…保　持　部　　５０…接地用基板
６０…接　地　板　　６１…遮へい板
６２…接地用接触子　　６３…基部係合部

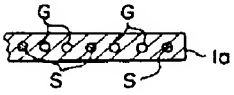
第 1 図



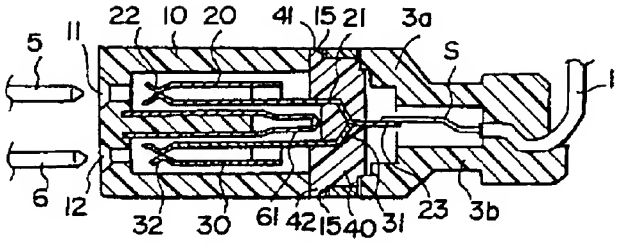
第 2A 図



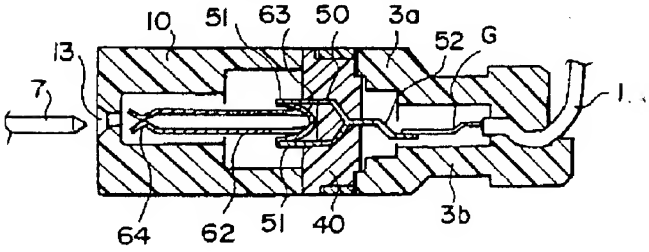
第 2B 図



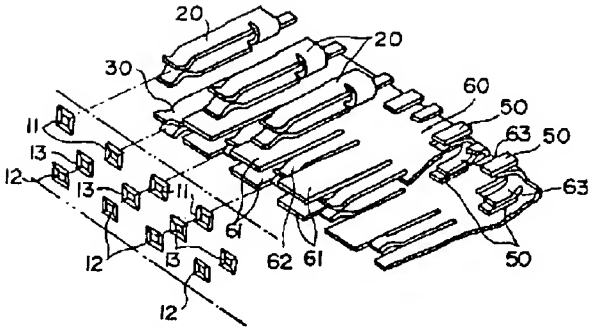
第 3 図



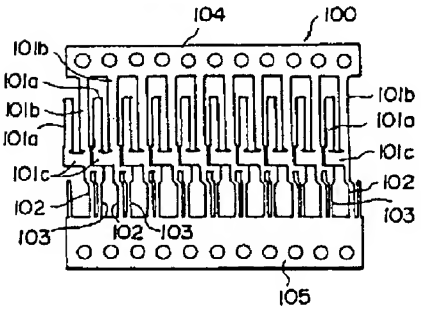
第 4 図



第 5 図

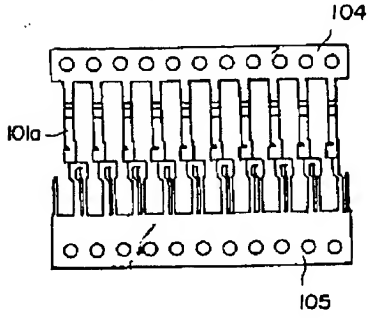


第 6A 図

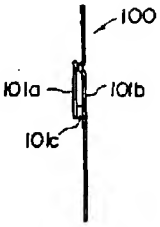


第 6B 図

第 7A 図

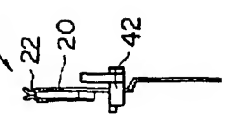


第 7B 図

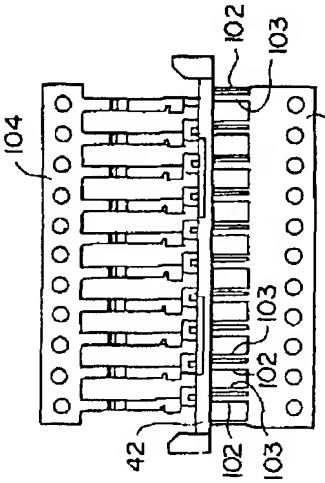


第8B図

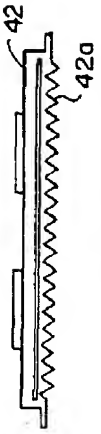
第9B図



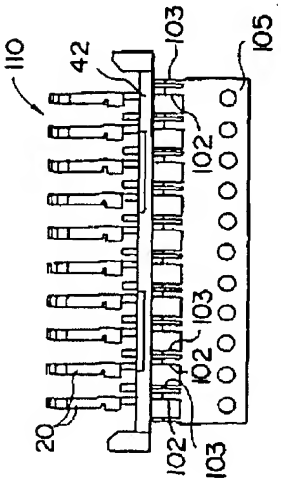
第8A図



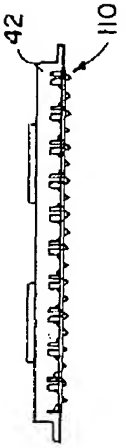
第8C図



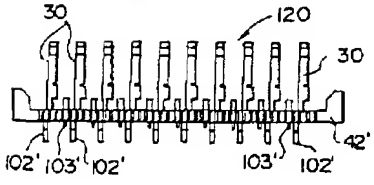
第9A図



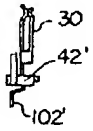
第9C図



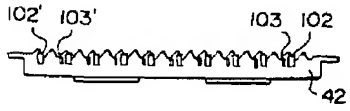
第10A図



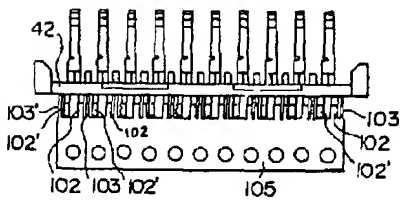
第10B図



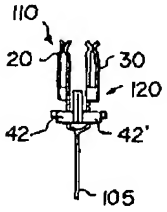
第10C図



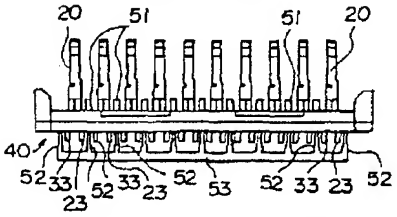
第11A図



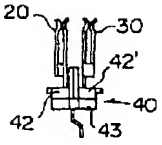
第11B図



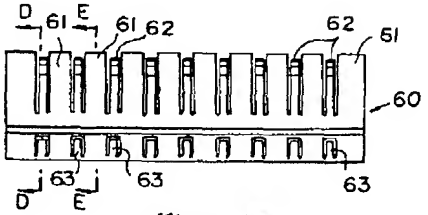
第12A図



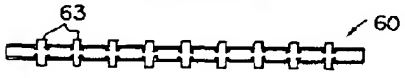
第12B図



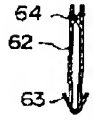
第13A図



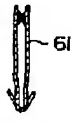
第13B図



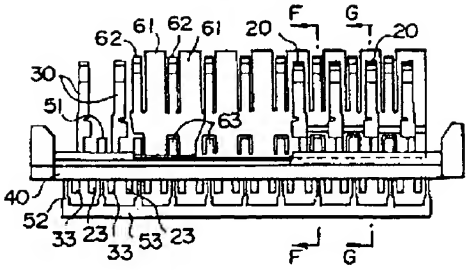
第14図



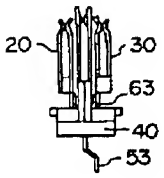
第15図



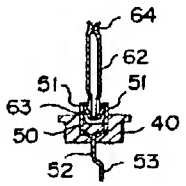
第16A図



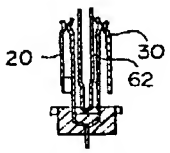
第16B図



第17図



第18図



* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] the pin grid array socket characterized by providing the following -- it is -- these contacts of two or more -- each of a member -- this -- the 1st housing member -- this -- the pin grid array socket which is put between the 2nd housing member and held at the state which can be rocked Housing with which it is constituted by combining the 1st housing member and the 2nd housing member, and two or more breakthroughs are prepared in the shape of an array. two or more contacts inserted in two or more of these breakthroughs, respectively -- a member
[Claim 2] two or more aforementioned contacts -- the pin grid array socket according to claim 1 from which it is the contact pin by which the end has projected each of a member to the exterior of the aforementioned housing, the piece of inner contact is inserted in the interior of the other end of this contact pin, and the electric flow between this contact pin and this piece of inner contact is secured
[Claim 3] two or more aforementioned contacts -- the pin grid array socket according to claim 1 from which each of a member is the contact sleeve prepared in the wall of the aforementioned breakthrough, the piece of inner contact is inserted in the ends of this contact sleeve, respectively, and the electric flow between this contact sleeve and each of this piece of inner contact is secured
[Claim 4] A pin grid array socket given in either of the claims 1-3 which the circuit pattern is prepared in the front face of the aforementioned housing, and is set as the value with the diameter of the breakthrough located near this circuit pattern among two or more aforementioned breakthroughs smaller than the diameter of other breakthroughs.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the PGA socket used in order to connect semiconductor chips, such as CPU which has pin shot array (it is hereafter called PGA for short) type contact arrangement, to other circuitry elements, such as a printed-circuit board.
[0002]
[Description of the Prior Art] Drawing 1 is the perspective diagram showing operation with a PGA socket typically.
[0003] Since a semiconductor chip (for example, CPU) 12 is connected to a printed-circuit board 14, the PGA socket 1 shown in drawing 1 is used. From the rear face of a semiconductor chip 12, two or more contact pins 13 arranged in the shape of an array have projected. On the other hand, a radiation fin 11 is typically formed in the upper surface of a semiconductor chip 12.
[0004] Corresponding to the contact pin 13 of a semiconductor chip 12, two or more contact holes 2 are formed in the upper surface of the PGA socket 1. On the other hand, from the rear face of the PGA socket 1, two or more contact pins 3 too arranged in the shape of an array have projected. The piece of inner contact (drawing 1 un-illustrating) is prepared in the interior of each contact hole 2, and it connects with the corresponding contact pin 3 electrically. Electrical installation is offered by this between the component (the composition of drawing 1 semiconductor chip 12) arranged at the upper surface side of the PGA socket 1, and the component (the composition of drawing 1 printed-circuit board 14) arranged at an inferior-surface-of-tongue side.
[0005] It connects with a printed-circuit board 14, and the PGA socket 1 to which the semiconductor chip 12 was connected is further carried in a mother board 19 through a socket 17. At this time, the electrical installation between these components is secured by the contact hole 15 of the upper surface of the contact pin 3 of the PGA socket 1, and the printed-circuit board 14 corresponding to it and the contact pin 16 at the bottom, and the contact hole 18 further prepared in the socket 17. In addition, on a printed-circuit board 14, other IC chips 21, the changeover switch 22 for changing the clock of a semiconductor chip 12 of operation, etc. are formed if needed.
[0006] Drawing 2 is drawing showing the composition of the contact hole 2 of the PGA socket 1, and the contact pin 3. Specifically, drawing 2 (a) is the partial cross section of the PGA socket 1. Moreover, drawing 2 (b) is the plan of the PGA socket 1 seen from the direction shown in drawing 2 (a) by Arrow A, and shows arrangement of the contact pin 3.
[0007] Generally the contact pin of the conventional PGA semiconductor chip is arranged in 2.54mm pitch. In accordance with this, the conventional contact hole 2 and the conventional contact pin 3 of the PGA socket 1 are also typically prepared in 2.54mm pitch. Furthermore, typically, the contact hole 2 and the contact pin 3 in this case are arranged at the peak of a grid, respectively, as shown in drawing 2 (b).
[0008] Drawing 3 is drawing showing the composition of the contact pin 3 contained in the conventional PGA socket. Drawing 3 (a) is drawing which looked at the contact pin 3 from the side. In fact, as shown in drawing 3 (b), space 4 is established in a part of interior of the contact pin 3, the piece 5 of inner contact is inserted in this space 4, and it is in contact with the main part of the contact pin 3. Therefore, the actual cross-section configuration of the contact pin 3 comes to be shown in drawing 3 (c). If the contact pin 13 (refer to drawing 1) of a semiconductor chip 12 carried in the upper surface of the PGA socket 1 is inserted in the contact hole 2 of the PGA socket 1, this piece 5 of inner contact will be contacted, and it will flow electrically on the main part of the contact pin 3 further.
[0009] Drawing 4 is drawing showing typically the composition of the printed-circuit board 14 which becomes the connection partner of the conventional PGA socket 1. Specifically, drawing 4 (a) is the partial cross section of a printed-circuit board 14. Moreover, drawing 4 (b) is the plan of the printed-circuit board 14 seen from the direction shown in drawing 4 (a) by Arrow B, and shows arrangement of a contact hole 15.
[0010] The contact hole 15 of a printed-circuit board 14 is further arranged also in the face-centered position while it is arranged at each peak of the grid of 2.54mm pitch, as shown in drawing 4 (b). With the field shown in drawing 4 (b), the contact pin 16 is inserted in the thing in the position which is equivalent to each peak of the grid of 2.54mm pitch among this contact hole 15 from the opposite side. Therefore, the contact pin of a printed-circuit board 16 is also prepared in 2.54mm pitch as a result.
[0011] Drawing 5 is drawing showing the state where the conventional PGA socket 1 is connected to the printed-circuit board 14. Specifically, drawing 5 (a) is the partial cross section of the PGA socket 1 in a connection state, and a printed-circuit board 14. Moreover, drawing 5 (b) is the plan of the printed-circuit board 14 seen from the direction shown in drawing 5 (a) by Arrow C.

[0012] The PGA socket 1 and a printed-circuit board 14 are located so that each contact pin 3 and 16 may shift to each other a half pitch (1.27mm), and it is equipped with them so that the contact pin 3 of the PGA socket 1 may penetrate the contact hole of a printed-circuit board 14 and may project from an opposite side. The contact pin 3 of the PGA socket 1 and the contact pin 16 of a printed-circuit board 14 which were projected are electrically connected by the wiring 23 formed in the front face of a printed-circuit boarc 14.
[0013] Furthermore, the suitable circuit pattern (un-illustrating) is prepared in the front face of a printed-circuit board 14, and it connects with other circuit element in which the contact pin 3 or 16 is carried on the printed-circuit board 14. The signal of the semiconductor chip 12 with which the PGA socket 1 is equipped is transmitted to a mother board 19 through a socket 17 by this, after required signal processing is performed on a printed-circuit board 14.
[0014] In manufacture of the conventional PGA socket 1, the contact pin 3 is pressed fit in the resin material which constitutes a socket main part, i.e., housing, and it fixes to it. At this time, the part of "the shape of a flange shown as a reference number 30 by drawing 3 " functions as the pressing section which fixes the contact pin 3 to housing.
[0015] Generally as for the semiconductor chip conventional PGA type, 2.54mm pitch is adopted. With the PGA socket of 2.54mm pitch corresponding to this, even if it presses the contact pin 3 fit in housing and manufactures it in this way, especially a problem is not produced in viewpoints, such as mechanical or an electrical property.
[0016]
[Problem(s) to be Solved by the Invention] The two following troubles exist in the conventional PGA socket 1 with which the contact pin 3 is being fixed to housing by pressing fit as mentioned above.
[0017] Each contact pin 3 is being firmly fixed to housing as a result of 1st pressing fit. In respect of maintenance of the contact pin 3 in such composition, although it is ideal, if some contact pins 3 are fixed aslant or a predetermined pitch is not obtained, the checking and verifying of the contact pin to the contact hole of the printed-circuit board which is a connection partner will become difficult. Therefore, at a pressing process, precise management of manufacture conditions is needed and, as for manufacture efficiency, a manufacturing cost, and a further, the improvement of the manufacture yield becomes difficult.
[0018] The trouble relevant to the inclination of the formation of a ** pitch in PGA type semiconductor device structure is in the 2nd. That is, in order to correspond to ** pitch-ization, the contact pin of a PGA socket also needs to be arranged in a ** pitch (for example, 1.27mm pitch). However, if it is going to manufacture such a ** pitch correspondence article by pressing fit like before, excessive stress is impressed to the housing resin between each contact pins 3, and a crack may arise in housing as a result. If it is going to avoid this, the manufacture yield will fall remarkably.
[0019] Therefore, it is impossible to manufacture the PGA socket corresponding to the formation of a ** pitch (for example, 1.27mm pitch) by conventional structure or the conventional manufacture method as a matter of fact.
[0020] Made in order that this invention may solve the above-mentioned technical problem, the purpose is offering the PGA socket corresponding to the formation of a ** pitch which can be efficiently manufactured with the sufficient yield.
[0021]
[Means for Solving the Problem] Housing with which the pin grid array socket of this invention is constituted by combining the 1st housing member and the 2nd housing member, and two or more breakthroughs are prepared in the shape of an array, two or more contact members inserted in two or more of these breakthroughs, respectively -- having -- these contacts of two or more -- each of a member -- this -- the 1st housing member -- this -- it is put between the 2nd housing member, and is held at the state which can be rocked, and the above-mentioned purpose is attained by that
[0022] two or more aforementioned contacts with a certain operation gestalt -- it is the contact pin by which the end has projected each of a member to the exterior of the aforementioned housing, and the piece of inner contact is inserted in the interior of the other end of this contact pin, and the electric flow between this contact pin and this piece of inner contact is secured
[0023] two or more aforementioned contacts with other operation gestalten -- each of a member is the contact sleeve prepared in the wall of the aforementioned breakthrough, the piece of inner contact is inserted in the ends of this contact sleeve, respectively, and the electric flow between this contact sleeve and each of this piece of inner contact is secured
[0024] With the operation gestalt of further others, the circuit pattern is prepared in the front face of the aforementioned housing, and it is set as the value with the diameter of the breakthrough located near this circuit pattern among two or more aforementioned breakthroughs smaller than the diameter of other breakthroughs.
[0025] Hereafter, an operation is explained.
[0026] The housing consists of PGA sockets of this invention by combining the 1st housing member and the 2nd housing member as mentioned above. The contact member (a contact pin or contact sleeve) inserted in the breakthrough, i.e., the contact hole, prepared in housing is held by putting by the 1st and 2nd housing members in the case of the above-mentioned combination. Consequently, "floating structure" where the contact member with which housing was equipped has a certain amount of flexibility, and is held at the state which can be rocked is realized.
[0027] By adopting such a maintenance mechanism, a contact member can be held in housing, without performing the pressing process generally at the time of manufacture of the conventional PGA socket

carried out.
[0028] furthermore, other circuitry elements (for example, semiconductor chip) with which a PGA socket is equipped according to such floating structure or contact of PGA socket itself -- even if a certain amount of gap is in the pitch of a member, when the contact member of a PGA socket inclines to some extent, the pitch gap is absorbed
[0029]
[Embodiments of the Invention] Below, the operation gestalt of this invention is explained with reference to a drawing.
[0030] (Gestalt of the 1st operation) Drawing 6 is the perspective diagram showing typically operation with the PGA socket 100 according to this invention.
[0031] The PGA socket 100 shown in drawing 6 is used in order to equip with a semiconductor chip (for example, CPU) 112 the socket 117 in which it was carried on the mother board 119. Furthermore, the PGA socket 100 has the function as a CPU accelerator which raises the internal clock frequency of a semiconductor chip (CPU) 112, and the changeover switch 122 for it is formed. However, it cannot be overemphasized that it is applicable also to the PGA socket used since a semiconductor chip is connected to a printed-circuit board as application of this invention is not restricted to the PGA socket which has such a CPU accelerator function and was explained as conventional technology for example.
[0032] From the rear face of a semiconductor chip 112, two or more contact pins 113 arranged in the shape of an array have projected. On the other hand, typically, a radiation fin 111 and the thermolysis fan 110 (or only either) are formed in the upper surface of a semiconductor chip 112.
[0033] Corresponding to the contact pin 113 of a semiconductor chip 112, two or more contact holes 102 are formed in the upper surface of the PGA socket 100. On the other hand, from the rear face of the PGA socket 100, two or more contact pins 103 too arranged in the shape of an array have projected. The piece of inner contact (drawing 6 un-illustrating) is prepared in the interior of each contact hole 102, and it connects with the corresponding contact pin 103 electrically. Electrical installation is offered by this between the component (the composition of drawing 6 semiconductor chip 112) arranged at the upper surface side of the PGA socket 100, and the component (the composition of drawing 6 socket 117) arranged at an inferior-surface-of-tongue side.
[0034] The PGA socket 100 to which the semiconductor chip 112 was connected is carried in a mother board 119 through a socket 117 as mentioned above. At this time, the electrical installation between these components is secured by the contact pin 103 of the PGA socket 100, and the contact hole 118 prepared in the socket 117 corresponding to it.
[0035] Drawing 7 (a) is the cross section of the PGA socket 100 of this invention. Moreover, drawing 7 (b) is the plan of the PGA socket 100 seen from the direction shown in drawing 7 (a) by Arrow D, and shows arrangement of a contact hole 102.
[0036] The contact hole 102 and the contact pin 103 of the PGA socket 100 of this invention are arranged in accordance with contact arrangement of the latest PGA semiconductor chip in the position equivalent to each peak of the grid of 2.54mm pitch, and **** of the grid, respectively. Consequently, with the PGA socket 100 of this invention, the contact hole 102 and the contact pin 103 are arranged in 1.27mm pitch which is a pitch of the conventional half.
[0037] Drawing 8 is drawing showing the composition of the contact pin 103 contained in the PGA socket of this invention. Drawing 8 (a) is drawing which looked at the contact pin 103 from the side. In fact, as shown in drawing 8 (b), space 104 is established in a part of interior of the contact pin 103, the piece 105 of inner contact is inserted in this space 104, and it is in contact with the main part of the contact pin 103. Therefore, the actual cross-section configuration of the contact pin 103 comes to be shown in drawing 8 (c). If the contact pin 113 (refer to drawing 6) of a semiconductor chip 112 carried in the upper surface of the PGA socket 100 is inserted in the contact hole 102 of the PGA socket 100, this piece 105 of inner contact will be contacted, and it will flow electrically on the main part of the contact pin 103 further.
[0038] It has the portion 130 into which the contact pin 103 contained in the PGA socket 100 of this invention was also processed so that it might have a "flange-like" configuration on the side as shown in drawing 8 . Although the contact pin 103 is held with housing using the portion 130 of the shape of this flange, in this invention, a pressing process like the conventional technology is not carried out in that case. The maintenance method of the contact pin 103 in this invention is explained below.
[0039] Drawing 9 is a decomposition cross section which explains the composition of the PGA socket 100 of this invention to a detail further.
[0040] Housing of the PGA socket of this invention is disassembled into two portions as illustrated. the following -- for convenience -- these -- respectively -- the 1st housing -- a member 132 and the 2nd housing -- a member 134 is called the 1st housing -- a member 132 and the 2nd housing -- a member 134 -- respectively -- being alike -- it is the grid pattern of 1.27mm pitch which was previously explained with reference to drawing 7 (b), and two or more breakthroughs 133 and 135 are formed The contact pin 103 which has the piece 105 of inner contact inside is inserted as previously explained to these breakthroughs 133 and 135 with reference to drawing 8 , and as anew illustrated also to drawing 9 .
[0041] like an actual erector, it is first shown in drawing 10 -- as -- the 2nd housing -- the contact pin 103 is inserted in the breakthrough 135 of a member 134, respectively next, the 2nd housing in the state where the contact pin 103 is inserted in this way -- a member 134 -- the 1st housing -- a member 132 -- combining -- the 1st housing -- the contact pin 103 is inserted in the breakthrough 133 of a member 132, respectively The configuration shown in drawing 11 is acquired by this. this time -- the 1st housing -- a member 132 -- the portion 130 of the shape of a flange of the side of each contact pin 103 -- the 2nd

housing -- each contact pin 103 is held by pushing against a member 134 at housing
[0042] It becomes unnecessary to carry out a pressing process in the manufacturing process of a PGA socket by adopting such a maintenance mechanism. Consequently, even if a PGA socket is formed into a ** pitch, generating of the crack in housing which poses a problem with the conventional technology with operation of a pressing process is avoidable. Therefore, according to this invention, a PGA socket of a ** pitch like 1.27mm pitch can be manufactured with the sufficient yield, for example.
[0043] Furthermore, unlike the case of maintenance by the pressing process in the conventional technology, by such maintenance mechanism, the contact pin 103 is not firmly fixed to housing. rather -- each contact pin 103 -- the 1st and 2nd housing -- among members 132 and 134, it has a certain amount of flexibility, and the sense can be changed That is, each contact pin 103 is held in the state which can be rocked at housing. Below, the maintenance structure of the contact pin 103 of this invention of having such a feature is called "floating structure."
[0044] Drawing 12 is the fragmentary sectional view showing typically the maintenance state of the contact pin 103 by such floating structure. The contact pin 103 indicated to be (II) all over drawing is held to the center line of the contact hole 102 shown with an alternate long and short dash line, without inclining. On the other hand, to the center line of the contact hole 102 shown with an alternate long and short dash line, the contact pin 103 indicated to be (I) all over drawing inclines slightly, and is held.
[0045] According to such floating structure, even if a certain amount of gap is in the pitch of the contact pin 113 of a semiconductor chip 112, when the contact pin 103 of the PGA socket 100 inclines to some extent, the engagement of the pitch gap can be absorbed and carried out with other circuitry elements connected to the PGA socket 100, for example, the composition of drawing 6 . Therefore, the dispersion is absorbed even if dispersion in a pitch accuracy is between each sample of a semiconductor chip 112 to some extent. Consequently, the use efficiency of a semiconductor chip sample improves.
[0046] Moreover, even if a certain amount of gap is in the pitch of the contact pin 103 of PGA socket 100 itself, according to floating structure, contact pin 103 itself inclines to some extent, and makes connection possible. Therefore, the level of the pitch accuracy of the contact pin 103 demanded at the time of manufacture of PGA socket 100 itself can be reduced.
[0047] In addition, the resin material which constitutes housing (the 1st and 2nd housing members 132 and 134) in the PGA socket of this operation gestalt is not necessarily restricted to a specific thing. For example, a polyamide, PBT, LCP, PES, etc. can use the material of the kind currently generally used in resin fabrication.
[0048] (Gestalt of the 2nd operation) With the PGA socket 100 of the 1st above-mentioned operation gestalt, the contact pin 103 which has the piece 105 of inner contact in the interior is inserted in each of two or more contact holes 102. On the other hand, if it swerves to the both ends of each contact hole 102 and the piece 105 of inner contact is swerved and formed in them instead of forming the contact pin 103, it will become the composition that the contact pin of an external circuit component may be inserted in the contact hole of a PGA socket from both directions.
[0049] Drawing 13 is the cross section showing the configuration of the contact hole 102 which enables the above composition.
[0050] The contact sleeve 106 for securing an electric flow is specifically inserted in the interior of each contact hole 102, and the piece 105 of inner contact is inserted from both sides, respectively so that it may be contacted further. At this time, the same effect as point ** can be done so by holding the contact sleeve 106 with the floating structure stated with the 1st operation gestalt. In addition, various configurations as not necessarily restricted to a specific thing and shown in drawing 13 as (a) - (d) are possible for the configuration of the contact sleeve 106.
[0051] Drawing 14 is the cross section showing typically signs that it is equipped with the semiconductor chip 210 and the printed-circuit board 220, to the PGA socket 200 of this operation gestalt which has a piece of inner contact from both directions as mentioned above. From one PGA socket 200 side, the contact pin of a semiconductor chip 210 is inserted and the contact pin of a printed-circuit board 220 is inserted from an another side side so that it may be illustrated.
[0052] (Gestalt of the 3rd operation) The PGA socket 300 in the 3rd operation gestalt of this invention is shown in drawing 15 . Specifically, drawing 15 (a) is the plan of the PGA socket 300, and shows arrangement of a contact hole 302. Drawing 15 (b) is the expansion plan of the portion shown as "E" in drawing 15 (a). Moreover, drawing 15 (c) is a cross section in alignment with line X-X shown in drawing 15 (a).
[0053] Fundamentally, the composition of the PGA socket 300 is the same as the composition of the PGA socket 100 in the 1st operation gestalt explained previously. That is, the contact hole 302 and the contact pin 303 are arranged in accordance with contact arrangement of the latest PGA semiconductor chip in the position equivalent to the position equivalent to each peak of the grid of 2.54mm pitch, and **** of the grid, respectively. Consequently, the contact hole 302 and the contact pin 303 are arranged also with the PGA socket 300 in 1.27mm pitch which is a pitch of the conventional half.
[0054] Here, with the PGA socket 300 of this example, wiring 310 is formed on the front face of the housing This wiring 310 is a circuit pattern to the loading section 324 in which the changeover switch 322 for changing the internal clock of the semiconductor chip (CPU) with which the PGA socket 300 is equipped is carried. This wiring 310 galvanizes on the resin front face which constitutes housing of the PGA socket 300, and is formed by the MID (Molded InterconnectionDevi ce) technology which forms the predetermined wiring 310 in the portion further.
[0055] Wiring may be formed in the housing front face also in the conventional PGA socket. However, with the PGA socket by such conventional technology, generally the contact hole and the contact pin are

arranged in each peak position of the grid of 2.54mm pitch, and the regarding-the-place margin for forming wiring exists in the housing front face comparatively. To it, by the PGA socket of this invention, as already stated, in addition to the peak of a grid, the contact hole and the contact pin are arranged also in the face-centered position, and are arranged in 1.27mm pitch as a result. Therefore, on the surface of housing, the margin regarding the place for forming wiring seldom exists.

[0056] Then, with the PGA socket 300 of this operation form, the configuration of a contact hole 302 is made into a different thing in the other parts near the formation part of wiring 310. The situation is further explained below with reference to drawing 15 (b) and (c).

[0057] The diameter of contact hole 302b specifically located near the part in which wiring 310 is formed is made smaller than the diameter of contact hole 302a of other parts. However, the diameter of contact hole 302c of the place where wiring 310 and the contact pin 303 are electrically connected by solder 340 is set as the value between the diameter of contact hole 302a, and the diameter of contact hole 302b.

[0058] Thus, by changing the diameter of a contact hole 302 alternatively, formation of the wiring 310 in the front face becomes easy with the PGA socket 300 of this operation gestalt. Furthermore, since a large distance between a contact portion (a contact hole 302 and contact pin 303) and wiring 310 can be taken, although the PGA pattern has formed the ** pitch, isolation voltage improves.

[0059] In addition, in order to form wiring in the front face with MID technology like this operation gestalt, it is desirable to use a liquid crystal polymer (LCP) as a resin material which constitutes housing.

[0060] the 1- described above -- in explanation of the 3rd operation gestalt, the contact hole and contact pin of a PGA socket of this invention are arranged in the position which is equivalent to each peak row of the grid of 2.54mm pitch at ****, and are arranged in 1.27mm pitch as a result Or even if it is the composition that a contact hole and a contact pin are arranged at each peak of the grid of 1.27mm pitch, being able to apply this invention and doing so the same effect as **** cannot be overemphasized.

[0061] Moreover, the numeric value of the pitch of contact arrangement is not necessarily restricted to the specific value which made reference by the above explanation.

[0062]

[Effect of the Invention] With the PGA socket of this invention, the contact member (a contact pin or contact sleeve) inserted in the breakthrough (contact hole) prepared in housing constituted combining the 1st and 2nd housing members is held by being put by the 1st and 2nd housing members as mentioned above. Consequently, it has a certain amount of [the contact member with which housing was equipped] flexibility, and "floating structure" which can be rocked is realized.

[0063] adopting such a maintenance mechanism -- the contact to housing -- since it becomes unnecessary to carry out a pressing process to the wearing sake of a member, even if a PGA socket is formed into a ** pitch, the crack initiation of housing resulting from a pressing process is avoidable Therefore, according to this invention, a PGA grid of a ** pitch like 1.27mm pitch can be manufactured with the sufficient yield, for example.

[0064] Furthermore, according to the above floating structures, even if a certain amount of gap is in the pitch of the contact pin of other circuitry elements (for example, semiconductor chip) with which a PGA socket is equipped, when the contact member of a PGA socket inclines to some extent, an engagement (connection) can be possible and the pitch gap can be absorbed.

[0065] moreover, contact of a PGA socket -- even if a certain amount of gap is in the pitch of a member -- floating structure -- contact -- a member -- itself inclines to some extent and makes connection possible therefore, the contact demanded at the time of manufacture of PGA socket itself -- the level of the pitch accuracy of a member is reduced

---

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective diagram showing operation with a PGA socket typically.
[Drawing 2] (a) is the partial cross section of the conventional PGA socket, and (b) is the plan seen from the direction shown in (a) by Arrow A.
[Drawing 3] (a) is the side elevation of the contact pin contained in the conventional PGA socket, (b) is drawing showing the piece of inner contact inserted in the cross section and the interior of the contact pin shown in (a), and (c) is the cross section showing the state where the piece of inner contact was inserted in the contact pin.
[Drawing 4] (a) is the partial cross section of a printed-circuit board, and (b) is the plan of the printed-circuit board seen from the direction shown in (a) by Arrow B.
[Drawing 5] (a) is the partial cross section showing the state where the printed-circuit board shown in drawing 4 is equipped with the PGA socket shown in drawing 2 , and (b) is the plan seen from the direction shown in (a) by Arrow C.
[Drawing 6] It is the perspective diagram showing operation with a PGA socket typically.
[Drawing 7] (a) is the partial cross section of the PGA socket in an operation gestalt with this invention, and (b) is the plan seen from the direction shown in (a) by Arrow D.
[Drawing 8] (a) is the side elevation of the contact pin contained in the PGA socket of this invention, (b) is drawing showing the piece of inner contact inserted in the cross section and the interior of the contact pin shown in (a), and (c) is the cross section showing the state where the piece of inner contact was inserted in the contact pin.
[Drawing 9] It is the cross section showing the composition of housing contained in the PGA socket of this invention.
[Drawing 10] It is the cross section showing the wearing process of the contact pin to housing contained in the PGA socket of this invention.
[Drawing 11] It is a cross section about signs that housing contained in the PGA socket of this invention was equipped with the contact pin.
[Drawing 12] It is the cross section expanding partially signs that it was equipped with the contact pin to housing contained in the PGA socket of this invention, and showing them in it.
[Drawing 13] (a) - (d) is the cross section showing various configurations which the contact sleeve with which the PGA socket of other operation gestalten of this invention is equipped can take.
[Drawing 14] It is the cross section showing the state where the semiconductor chip and the contact pin of a printed-circuit board are inserted in the contact sleeve shown in drawing 13 .
[Drawing 15] (a) is the plan of the PGA socket in the operation gestalt of further others of this invention, (b) is some partial expansion plans of (a), and (c) is a cross section in line X-X shown in (a).
[Description of Notations]
1 PGA Socket
2 Contact Hole
3 Contact Pin
5 Piece of Inner Contact
11 Radiation Fin
12 Semiconductor Chip
14 Printed-circuit Board
17 Socket
19 Mother Board
21 IC Chip
22 Changeover Switch
100 PGA Socket
102 Contact Hole
103 Contact Pin
105 Piece of Inner Contact
106 Contact Sleeve
110 Thermolysis Fan
111 Radiation Fin
112 Semiconductor Chip
117 Socket
119 Mother Board

122 Changeover Switch
132 1st Housing -- Member
134 2nd Housing -- Member
200 PGA Socket
210 Semiconductor Chip
220 Printed-circuit Board
300 PGA Socket
302, 302a, 302b, 302c Contact hole
303 Contact Pin
310 Wiring
322 Changeover Switch
324 Changeover Switch Loading Section

[Translation done.]